DOCUMENT RESUME

ED 039 702 56 EM 008 035

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TITLE Instructional Television: The State of the Art.
INSTITUTION Academy for Educational Development, Inc., Washington, D.C.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO BR-8-0571
PUB DATE [70]
NOTE 53p.; This is one of the support papers for "To Improve Learning: a Report to the President and the Congress of the United States by the Commission on Instructional Technology", ED 034 905

EDRS PRICE EDRS Price MF-$0.25 HC-$2.75
DESCRIPTORS Educational Planning, *Educational Policy, Facility Case Studies, Instructional Technology, *Instructional Television

ABSTRACT

In attempting to assess the current state of instructional television, this paper concerns itself first with the various distribution systems and pieces of machinery available to educators and in use across the country. It deplores the inflexibility of the American educational structure which has not yet committed itself to the full exploitation of the possibilities of instructional television. The organizational and administrative structures prevalent in education are commented upon, and their inherent ability to assimilate television into the system is demonstrated. Several case studies chosen by the National Association of Educational Broadcasters are presented as examples of instructional uses of radio and television. (JY)

ED039702

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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INSTRUCTIONAL TELEVISION

The State of the Art

by Frederick Breitenfeld, Jr.*

Foreword

This paper is divided into four sections in an attempt to isolate a variety of overlapping issues under the headline, "Instructional Television." Section I concerns the various distribution systems and pieces of machinery available to educators and in use across the country. Section II addresses itself to the larger question of television in education, and the third section amounts to a comment on organizational patterns in education and their inherent ability to assimilate television systems. Section IV is a collection of case studies, as they were submitted recently to the National Association of Educational Broadcasters.

Any attempt at a statement of the "state of the art" becomes, sooner or later, an editorial comment. So it is with this submission. The opinions, as they are rendered in the text, do not necessarily represent those of ITV practitioners or other educators.

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RECOMMENDATIONS

I. Toward The Wired City

With a combination of public and private money made available, an American city with classic urban problems could be wired for multi-channel closed circuit operation. Instructional services could be provided for schools, municipal agencies, industry and other entities, and the entire project could become a showcase for the effective use of television in education.

II. Toward The Enlightened School System

Architects designing schools deserve assistance in providing flexibility for television. A national project, in cooperation with AIA, could be mounted toward this end. Similarly, through the American Association of School Administrators, an informational service on television systems and curricula could be established for a continuing flow of "state-of-the-art" facts.

Public and private assistance is required to equip schools with equipment for internal television distribution systems and, where appropriate, recorders and production facilities.

Developing school districts should be encouraged with public and private aid to establish new administrative structures that are appropriate for the use of television.

Demonstration vans and traveling TV advisory services, as now funded in part by Title III of the Elementary and Secondary Education Act, should be further developed and supported on local and regional bases.

III. Toward an Improved Educational Product

Colleges training teachers and administrators must be urged to change curricula to include proper emphasis on the use of television in classrooms. Separate curricula should be developed for ITV specialists.

The production and distribution of superior ITV packages must be encouraged with public and private money. Toward this end, aid might well be given to existing ITV libraries and program services.

IV. Toward Technical Compatibility

Standardization of video recorders and attendant machinery must be urged through professional engineering associations and manufacturers.

INSTRUCTIONAL TELEVISION - THE STATE OF THE ART

I. TECHNICAL

There are basically three ways to distribute television signals. They are used in combination and singly, depending upon specific circumstances. The three are closed circuit television, 2500 mc operation and broadcast television.

Closed circuit television is sometimes called "wired" television, though this name is not altogether accurate. CCTV amounts fundamentally to cameras and recorders and film projectors at one end of a system, television screens at the other end and coaxial cable or microwave links between them. Many schools, universities and industries own closed circuit systems that involve such sources and reception points. As buildings are wired for television origination, distribution and reception, the term "CCTV" is applied.

A closed-circuit distribution system can also include only an antenna, attendant transformers, other hardware, cables and the usual reception points. Here, the origination of the signal can take place beyond the building, and the antenna itself acts as the source of signal for the system. This is also called "closed-circuit," though it is more accurately a simple "internal distribution" system. Thousands of schools are participating in television projects with only basic reception capability and internal distribution systems. As a group of buildings might be interconnected within the same CCTV system, the coaxial cables can be placed underground, or permission may be granted by the Federal

Communications Commission for the institution to operate "point-to-point" broadcasting systems. This involves the use of extremely high frequency (microwave), broadcast and reception links, with specific routes for the signals. The telephone company provides both wired and microwave interconnection services.

Decisions are usually made by technically qualified consultants and engineers regarding the best possible means of signal distribution within closed circuit systems. The decisions are based upon the primary purpose of the system, topography, the desire of a local telephone company to carry signals, and the presence of educational television production facilities or stations in the area.

Thus, a closed-circuit system can amount to a distribution system within a building, wired interconnection among buildings and microwave links. "CCTV" refers to the simple reception and distribution of a signal, or it can include signal preparation and production within local studios.

In some instances, entire states are interconnected through closed-circuit television systems. In South Carolina, for instance the majority of public schools are interconnected on a state-wide basis. The legislature appropriates money for the ETV operation, and the telephone company provides network facilities. Distribution systems are built into each school.

In Delaware, another example, the entire State is interconnected in much the same way. The State Center for Educational Television is located at Dover, and signals are distributed to all schools, which in turn have their own distribution systems. Another extensive closed-circuit system is the well-known installation

in Washington County, Maryland, with studios at Hagerstown. Here, a collection of county schools is bonded with television interconnection, again through services provided by the telephone company.

One great advantage of wired systems is that more than one signal can be carried through the same cable. Thus, the South Carolina, Delaware and Hagerstown installations provide many channels for each school. Within schools, the same is true, assuming that "RF" distribution systems are incorporated.

Closed circuit television is used by the military, by industry, by schools and by colleges, as well as by hospitals and municipal agencies. Since no federal permission is required to operate a CCTV system, at least if a microwave link is not included, there is no precise knowledge as to how many systems exist. Estimates are that there are well over one thousand closed circuit installations, complete with studios, across the country and many think that there are probably twice that number. Assuredly, there are thousands of schools with simple reception and distribution capabilities, <u>though we have barely started in equipping classrooms with receivers.</u>

The campus-wide closed circuit system at Ohio University is an example of installations at colleges and universities; there are scores of others. These are totally intramural systems, owned and operated by and for the local institutions, though there are examples of inter-institutional cooperation within states, such as New York, and even among states, such as television projects now being considered by the Southern Regional Education Board. These systems allow for taped

lectures to be distributed to screens viewed by small groups of students. Technically, the systems are quite successful, since simple transportation of a moving image from one place to another via television is quite common.

In a growing number of areas, commercial entrepreneurs establish community-wide distribution systems called "Community Antenna Television" or CATV. There are close to two thousand such systems, some providing service to very wide areas, such as a CATV serving northern Michigan. Very often, these cable systems provide free distribution for school boards, universities or other agencies. This could well be one of the most important distribution means for instructional television signals in the future, though it might not be apparent at present, at least as measured by usage.

If special frequencies were set aside for use by satellites, then an extension of the microwave idea could include interconnection across entire countries. Satellite-to-school reception is not something to which we can look forward in the near future, however, and nationwide interconnection of this sort would probably involve placement of regional "ground stations." This would mean that statewide and even regional distribution would still be required.

A second method of signal distribution is a low-power broadcast technique requiring a license granted by the Federal Communications Commission. This is "2500 mc."

The segment of the electromagnetic spectrum between 2500 and 2690 megacycles has been set aside by the FCC for the exclusive use of educators.

The band of frequencies has become known by a number of names such as "2500 mc," "2500 megaHertz," (2500 mHz), and "2.5 gigaHertz," (2.5 gHz), or, as the FCC refers to it, "Instructional Television Fixed Service" (ITFS).

A television picture, with accompanying sound and technical signals, requires a band width of six megacycles. Therefore, between 2500 and 2690 megacycles, there lie a maximum of 190/6 or 31 possible channels. The FCC has regulated the 2500 mc band in such a way that applications for channels are submitted in groups of four.

ITFS systems, therefore, provide for simultaneous broadcasting, by a single licensee, of more than one signal.

A 2500 mc signal generally has a coverage radius of from 8 to 25 miles, depending upon topography. Usually, an entire school system can be covered with such a system. Schools receiving 2500 mc signals use special antennas and ordinary intramural distribution systems, with "down-converters" to allow classroom monitors to receive the signals.

The Federal Communications Commission has encouraged school systems to investigate the potential of this specially reserved frequency band.

During the final quarter of 1968, close to one hundred ITFS construction permits had been granted by the Commission, with approximately twenty-five permits pending. Almost sixty 2500 mc systems are now on the air, using a total of one hundred and twenty-eight channels, an average of something more than two channels per licensee.

The chief of the Educational Broadcasting Branch of the FCC has commented that the growth in 2500 mc applicants and licensees has taken a strong turn. He has indicated that the number of school systems involved in this type of signal distribution is likely to increase quite rapidly in the near future.

There are any number of uses to which a 2500 mc system might be put. For instance, training for firemen, policemen, clerks and other municipal employees could take place with this type of system. Industries could take advantage of the 2500 mc potential, and institutions of higher education could also participate. The problem is one of equipping the reception points with proper antennas, distribution systems and monitors, and in convincing various administrators that the service is worth an initial investment and commitment.

The idea that more local agencies than a single school system might use a 2500 mc system has given rise to a new and fascinating concept. The idea of a "single licensee" for all noncommercial broadcasting in a market has been proposed, and the Federal Communications Commission - along with many others in the field - is now considering the possibility.

The suggestion is that a noncommercial broadcast station, a municipal production facility or a school system might be given FCC permission for eight, twelve, sixteen or even more channels in a single market. In this way, the instructional needs of a wide variety of populations could be served through a central television production and distribution facility. WVIZ, the noncommercial broadcast licensee in Cleveland, has applied, as a "single licensee," for sixteen

channels in the 2500 mc band, with the understanding that the system would be used in conjunction with a large group of industrial, municipal and educational agencies.

It may be that this new idea in local instructional service will become the cornerstone for instructional television in this country. If a municipality can centralize its instructional television production and distribution facilities, and still have the freedom to make use of broadcasting, 2500 mc channels and even closed circuit installations, the variety of services that could be provided is staggering, and the quality of the lessons themselves could assuredly be higher than if each agency went on developing and producing its own internal training projects.

Television signals are also distributed, on a one-signal-per-licensee basis, by commercial and noncommercial broadcasting stations. These signals are received at schools and universities with ordinary antennas, and are then fed into internal distribution systems within buildings or campuses.

Many commercial stations in the country have provided free air time for school systems. In Baltimore, for instance, instructional television has been part of the city's Board of Education since 1948, and commercial stations in the area provide production spaces and air time. (In that city, barely one fifth of the public classrooms, however, are equipped with television receivers.) Special note should be made of the cooperation and generosity of the commercial broadcasting establishment over the years in providing all kinds of help for ITV practitioners.

More commonly, noncommercial, educational, or public TV stations provide instructional services for schools in their coverage areas. These stations are owned by private corporations, by school systems, by colleges and universities, and by states or state authorities. In many cases financial arrangements are made between stations and school systems in an area and it is not uncommon to find a school system paying something like two dollars per student per year for instructional television services. These contractual agreements have provided many noncommercial television stations with up to a third of their annual incomes.

The number of noncommercial, educational - or public - television stations on the air is growing each month, with more than one hundred seventy-five stations on the air in early 1969.

This "broadcast" signal is the most commonly understood means of television distribution. The details of public broadcasting as a national instrumentality and as a group of local stations, however, have been covered in other documents.

School officials often ask what it "costs" to use or to build ITV systems. The question has no answer without specific sets of circumstances. In some cases a school will simply receive a signal and distribute it within its own walls. In this case, the antenna will cost from $50 to $200, and receiver costs will vary from $100 to $400 depending upon quality and the ubiquitous color-or-monochrome decision. In wiring buildings, a "per drop" cost estimate is common. If enough reception points are to be built into a system, then a $35 to $50 "per drop"

charge is probably appropriate. This means that if a building is to include a television distribution system for forty rooms, then the cost of wiring the building, excluding antenna and monitors, will be forty times the local "per drop" charge, as estimated by technical consultants.

Beyond simple distribution systems, however, types and costs of equipment continue to change and to confound educators. Once a school, a school system or a university decides to include a recording or simple playback capability in its system, for instance, new decisions must be made.

Virtually all broadcast stations, both commercial and noncommercial, use video tape recorders of the highest quality. These require video tape two inches wide, and the machines are called "quadrature" recorders. All quadrature recorders are compatible, which allows for total interchange of tapes among broadcast stations. Still, they cost from $50,000 to $100,000 each, and this is generally well beyond the budget limit that a school system might have for a single recorder.

Less expensive tape recorders (as low as $500), make use of a different scanning technique in recording and playback, and these are called "slant track" or "helical scan" recorders. The tapes required by these machines are of varying widths, and this important factor is only one of several contributing to the tragedy that slant track machines are basically incompatible with one another. Of course, single manufacturers now guarantee that their own machines are compatible, but there remain no industry-wide standards for compatibility among

slant track video recorders.

This means that it is possible for an entire school system to equip itself with helical scan recorders that are either incompatible with one another or, at best, unable to play tapes recorded on other machines in other geographic areas. A "dubbing" process is possible in transferring from one type of tape to another, but this simply provides a delay and a financial burden.

Page 11 of this report shows comparisons of a number of recorders now available. There are others, to be sure, but the important point in discussing the state of the art is that compatibility of video tape recorders remains a serious impediment to regional and national cooperation among institutions. Efforts have been made within various associations to establish technical standards for recorders. Such standards could easily be drawn, and their universal use could virtually eliminate the incompatibility problem. Still, with manufacturers across the globe distributing video equipment for varieties of purposes, it does not seem likely that the industry will settle the question itself. Instead, county, state and even national education agencies might have to develop standards for compatibility, distributing them as widely as possible among potential customers in education.

As schools and colleges move toward the actual production of instructional television series, they must purchase studio equipment. Here again, the field is confusing. Without a "systems" approach, the educator is forced to make decisions that go far beyond one fiscal year in impact.

MAKE	WIDTH OF TAPE	TYPE NO.	COUNTRY OF MANU-FACTURE	USE FOR WHICH DESIGNED	NO. OF HEADS	HEAD SPEED RPM	WRITING SPEED INS/SEC	FREQ. RE-SPONSE	LINE RESO-LUTION	TAPE INTER-CHANGE ON SAME MODEL	TAPE SPEED IN./SEC.	LENGTH OF PLAYING TIME	SIGNAL TO NOISE	STILL FRAME	EXTRAS, BENEFITS, ETC.	PORT-ABLE	WEIGHT LBS.	EDUCA-TIONAL PRICE $
Ampex	2	VR1000C	U.S.A.	Broadcast	4	14,400	approx. 1,500	4.5Mcs	up to 600	yes, also w/other models	15	96 min. 14" Reel	42 db	No	Automatic & Vert. Electronic edit	No	1,900	50,000.
Ampex	2	VR1100C	U.S.A.	Broadcast	4	14,400	1,500	4 Mc/s	approx. 450	Yes, and w/o. mod.	15/7½	96/192 min.		No	Transistorized Electronic edit	No	800	40,500.
Ampex	2	VR2000	U.S.A.	Colour Broadcast	4	14,400	1,500	4.2 Mc/s	approx. 500	Yes, and w/o. mod.	15/7½	96/192 min.		No	As for VR1000C plus colour	No		approx. 70,000.
Ampex	2	VR660	U.S.A.	Portable Broadcast	2 @ 180 deg	1,800	650	3 Mc/s	approx. 400	Yes	3-7	5 hrs. 12½ R	40	Yes	2nd Audio Track simple electronic edit	Yes	100	approx. 9,000.
Ampex	2	VR1500	U.S.A.	CCTV	2 @ 180	1,800		3 Mc/s	approx. 400	Yes	3-7	64 min. 8" R	40	Yes	2nd Audio Track	Yes	120	
Sony	2	BV 100 BV 120	Japan	Broadcast	1 Video 1 Sync			3.4 Mc/s		Yes	4.25	84 min.		Yes	Slow Motion	No		
RCA	2		U.S.A.	Broadcast	4	14,400	1,500			Yes, and w/o. mods.	15	96 min. 14" Reel		No		No		
Dage Newvicon	1	DV 300	Japan	CCTV	2	1,800	833	Approx. 4 Mc/s	330	Yes	5.91	63 min.	38	Yes	Slow Motion Audio Amp. & Spkr.	Yes	147	approx. 8,500.
Ampex	1	VR7000	U.S.A.	CCTV	1	3,600	1,000	3.5 Mc/s	350	Yes	9.6	63 min.	42	Yes	Audio Amp. & Spkr. RF Out	Yes	100	3,505.
Sony	1	EV200	Japan	CCTV	2 @ 180		550	3.2 Mc/s	325	Yes	7.75	63 min. 8" Reel		Yes	2nd Audio Track Slow Motion	Yes	70	4,250.
Phillips	1	EL3400	Holland	CCTV	1	3,600	930	2.5 Mc/s	approx. 250	Possible	9.0	45 min.		No	RF In RF Out	Yes		2,850.
Precision Instruments	1	P13V P14V	U.S.A.	CCTV	2 @ 180	1,800		3.5 Mc/s		Yes	7.5 0-85	96 85		Yes	Variable Speed	Yes	75	9,462. 12,490.
Ampex	1	VR6000	U.S.A.	Home T.V.	1	3,600		Est. 2.2 Mc/s	225	Possible	9.6	63 min.						approx. 1,600.
Sony	½	Video-corder	Japan	Home T.V.	2			Est. 1.5 Mc/s	approx. 200	No	7.5	30 or 60 min.						approx. 500.
Concord	½	VTR 600	U.S.A.	Home T.V.	2			Est. 1.5 Mc/s	220	No	12	40		Yes				approx. 500.
Pana-sonic	½	Tape A Vision	U.S.A.	Home T.V.	2			Est. 1.5 Mc/s		No	12	40		Yes				approx. 1,500.
Woolen-sak	½		U.S.A.		2			Est. 1.5 Mc/s	approx. 150	Possible	7.5							approx. 1,600.

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Television cameras are defined in two ways. First, of course, they are either black-white cameras, or they are capable of reproducing color. Beyond that, television cameras are identified by the type of pick-up, or light sensitive, tubes they use.

Cameras generally regarded as providing "broadcast quality" pictures (that is, cameras used in conjunction with quadrature recorders at broadcast stations), use image orthicon tubes or plumbicon tubes. Cameras with these tubes as their hearts are generally more expensive, larger, and operate surprisingly well under low light levels. Cameras used most frequently in industrial television systems, instructional closed circuit systems, many ITFS systems and other non-broadcast installations incorporate vidicon tubes. These cameras are smaller, easier to operate, and provide perfectly satisfactory pictures for general use. Black-and-white vidicon cameras can be purchased for as little as $300, though these are not suitable for most instructional purposes. Image orthicon cameras begin at about $12,000 and most broadcast facilities purchase cameras that cost $40,000 or more. Descriptions of cameras are included on page 13.

The state of the art in instructional television, then, includes many possible studio packages involving cameras of varying qualities and prices.

Color television is becoming quite common in the broadcast industry. In fact, most noncommercial television stations are either converted to color or planning for it. (Purchasing a broadcast quality black-and-white camera at this time is actually quite difficult!) In instructional settings, though, black-and-white

Types of monitors now available

Common Types Available	Example	Model No.	Approximate Cost Educational
Video, high quality in metal cases	Conrac 23"	CVA23C	$444.00
Classroom type, for video, VHF and UHF	Admiral 23"	E55YU	239.00
Classroom type for VHF and UHF	Admiral 23"	E55U	220.97
Classroom type for VHF only	R.C.A. 23"	TE3543	213.95

(A factory installed video input modification is available for the TE3543 at $30 extra)

LENS ANGULAR FIELD OF VIEW TABLE

Lens Focal Length in mm	Horizontal Angle Approx.	Vertical Angle Approx.	With the Camera Width of View	12 ft. From Subject Height of View
12.5	60°	45°	12′	9′
25	30°	22.5°	6′	4′6″
50	15°	11.25°	3′	2′3″
75	11.25°	8.5°	2′3″	1′8¼″
100	7.5°	5.75°	1′6″	1′1½″
150	5.75°	4.25°	1′1½″	10″
200	3.25°	2.5°	9″	6¾″

PRICE RANGE (EDUCATIONAL)	SOME OR ALL OF THE FEATURES	RESOLUTION	USES
Up to $500	Non-professional cameras Random sync, oscillator controlled	200 to 400 lines	Home TV Some Industrial application.
$500 to $1,000	Industrial sync, crystal controlled Some variable adjustments Full scan protection Automatic Target	400 to 650 lines	Many Industrial applications. Static views, timetables, etc. Many general closed circuit TV uses, where small detail is not required.
$1,000 to $2,500	2:1 interlace or EIA sync May be internal or external sync drive All variable adjustments Some adjustments remotely controlled 3 or 4 lens turret Scan protection Automatic Target often for 4000:1 light variation Tally lights Plug in circuit boards and sub-assemblies	650 to 800 lines	Closed circuit TV Used for detailed work. Slides, books, photographs, microscopes, etc. can be used singly or in systems of 2, 3, or 4 cameras. Can be used in remote locations and remotely controlled. With small modifications may be used in film chains. Used where a clear sharp picture is required.
$2,000 to $5,000	Full EIA sync. Internal or external or both Viewfinder types All variable adjustments Some adjustments remotely controlled 3 or 4 lens turret Scan protection Automatic Target Tally lights Plug in circuit boards and sub-assemblies Intercom systems using camera headsets	650 to 800 lines	As above, plus the use of Viewfinder in studios, laboratories, arenas, theatres. Any time any artistic camerawork is required, using a cameraman.

Chart above lists various types of television cameras as a guide to price range, features and uses.

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systems persist. With color systems generally costing at least twice as much as comparable monochrome installations, and with maintenance costs being much higher for color, educational institutions seem to continue to build black-and-white systems.

The total costs involved in instructional television are estimated in a variety of ways. Some prefer to discuss simple capital and operating expenditures for television installations, and other insist that a "per-student" cost is the proper foundation for cost estimates. To confound the issue further, the varying types and qualities of recorders, cameras and other pieces of equipment make precise figures almost impossible to report. However, cost estimates are usually easy to project with given circumstances and systems.

CONCLUSION

The state of the art, as far as technical capability in ITV is concerned, is advanced and still improving. We are capable of transmitting TV pictures over long distances with accuracy, using a variety of possible systems and combinations. Costs are dropping as new circuitry and modes are developed. Among educators, however, knowledge of the technical "state of the art" is generally lacking. Our technical prowess in ITV is much more advanced than our educational, social and political abilities.

II. EDUCATIONAL

Any discussion about instructional television, except one concerned solely with hardware, must logically become a discussion about instruction. The general, public state of the art in instruction is just about what it was fifty years ago: crude, static, ponderous, administered through hopeless bureaucratic entanglements, and generally oriented toward teaching rather than toward learning.

No reasonable definition of "instructional television" seems possible, except in lofty and unmanageable terms. Beyond that, the very function of television in instruction varies with every application, so an attempt to define it through what it does is also disappointing. ITV has been called "a teaching tool" and "an aid to teaching," but both of these imply that the medium is something to be added to present modes of instruction. This is an important factor in the state of the art: ITV is regarded in many areas strictly as a supplement. However, the medium can be employed successfully as the prime distributive belt in instruction, as on American Samoa. The point is that the state of the art is so primitive that the supplement versus core argument is still being waged, just as if it had meaning.

Estimates of those exposed to television in classrooms vary between one-fifth and one-half of our student population. A recent study conducted by the Morse Communications Research Center of Brandeis University and National Instructional Television (previously the National Center for School and College Television), concentrated on programming trends among the nation's ETV

stations. About a third of all material aired by the noncommercial licensees, according to the report, is designed specifically for school audiences. Of this programming, almost a third comes from regional or national sources.

The numbers and types of instructional programs being produced, used and distributed are so many and so varied that the Compendium of Televised Education is published by Michigan State University, as compiled and edited by Lawrence E. McKune. This vital document has been brought up-to-date more than a dozen times, and the listings -- the good with the not-so-good -- continue to grow.

Many installations, such as the ones in Hagerstown and South Carolina, produce most of their own television material. The many military installations using television for training also concentrate on locally produced material as do most universities employing the medium. There is a lot of seminar talk about "sharing resources," and television can certainly make this possible. Still, many institutions and agencies consider their needs unique, and widespread interconnection and commitment are not to be found.

Scores of ITV systems, however, use material produced elsewhere, usually at broadcasting stations, which serve large numbers of schools and school systems. Several regional and national libraries have been established as distribution agents for these series. The Eastern Educational Network, for example, of which almost two dozen stations are affiliates, distributes ITV programming among its members, and even to customers beyond the northeast.

Other libraries, such as the Great Plains Instructional Television Library and National Instructional Television, exist across the country and are growing, however slowly. The fear of "nationalized" curricula is as it must have been when textbooks were first published and distributed, but this feeble objection to centralized production services will probably disappear.

Whatever the distribution means, and whatever the institutions or schools involved, the administrative and educational procedure is usually the same. A "teacher's guide" is developed and distributed by the television agency to all classrooms in which a specific television series or lesson is to be received. The document contains suggested "pre-telecast" activities, a description of the televised segment, and suggestions for "post-telecast" activities. These guides are duplicated by a variety of processes, depending upon local budgets and commitment, and they range from the pitifully amateurish to the professional.

Assumedly, the classroom teacher studies his guide, arranges his schedule to include the television segment (contrary to what many believe, a televised lesson usually amounts only to a segment of a class period), and proceeds with the planned lesson. Unfortunately, many teachers are reluctant to become involved, and they demonstrate this by leaving the room while the television set is on, by paying no attention to the lesson as it might be relevant to activities in the classroom and by implying a negative attitude to the students. This is far more prevalent than might be inferred from scattered

reports of ITV "successes." This lack of involvement on the part of classroom teachers is probably one of the most significant properties of instructional television.

Where a school or university receives the signal of a broadcast station, or any signal over which it does not have full control, the problem of scheduling becomes critical. If tenth grade mathematics is to be offered at 11:00 a.m., for instance, fitting it simply into one large high school would be quite an achievement, but arranging an entire school system for it would be an administrative miracle. Under present circumstances, then, the school with its own recording and playback ability has a distinct advantage, especially if it has the internal ability to distribute more than one signal at a time. As it happens, very few schools are so equipped, and only a small percentage of our nation's classrooms are capable of receiving and showing television pictures. Therefore, as we design "production centers" and other centralized ITV establishments, we become part of the educational establishment that tends to forget that the drama's leading character is the student. The "software" know-how, as in education without technology, is missing.

With very few exceptions, television is usually simply dumped on established curricula and administrative systems. As such, it becomes an addendum, an adjunct, and ultimately an insignificant line item in the annual budget. Solid attempts to use the medium effectively are few. Television

has simply not caught the fancy of those who make big educational decisions.

The exemplary cases, however, should not go unnoticed. In Chicago, it is possible to earn a junior college degree with broadcast television - into the home - as a principle means of instruction. In South Carolina, at the United States Air Force Academy and at scores of other establishments, television is accepted as part of the instructional patterns. Generally, however, these systems become exemplary only because there are so few in which the medium has made any positive impact at all.

What is happening to students exposed to television remains fundamentally as mysterious as what is happening to them through books, field trips, overhead projections and efforts of teachers in classrooms. The question always becomes one concerning <u>education</u> and not one concerning a <u>medium</u>. Television does not teach; teachers teach.

Still, "Can television teach?" is the question that has been asked since the medium first appeared in classrooms. The answer is no, of course, just as a megaphone can't teach, but the apparent need to deal with the question continually demonstrates the basic attitude with which educators approach television. The research done by graduate students, psychologists, government agencies, and teachers continues to abound, with much the same design. One group is taught through television, and another group is taught by what are somehow called "traditional" methods. There are variations, to be sure, but the same basic research has been done hundreds of times, with various

peripheral questions shifted to become paramount. We continue to set up controlled circumstances and then to measure, however crudely, which lenses, which graphics and which program formats "teach" more than others.

The Institute for Communication Research, at Stanford University, has published a document by Godwin C. Chu and Wilbur Schramm called, "Learning From Television: What The Research Says." It is a compilation of the investigations that have been taking place for years. The authors suggest that many statements can now be considered valid:

-- Given favorable conditions, children learn efficiently from instructional television.

-- So far as we can tell from present evidence, television can be used efficiently to teach any subject matter where one-way communication will contribute to learning.

-- Television is more effective as a tool for learning when used in a suitable context of learning activities at the receiving end.

-- Television is more likely to be an efficient part of an educational system when it is applied to an educational problem of sufficient magnitude to call forth broad support.

-- Television is more likely to be an efficient tool of learning if it is planned and organized efficiently.

-- Where learning of perceptual-motor skills is required, a subjective angle presentation on television will tend to be more effective than an objective angle presentation.

-- Attention-gaining clues that are irrelevant to subject matter will most probably have a negative effect on learning from instructional television.

-- There is no consistent evidence to suggest that either humor or animation significantly contributes to learning from instructional television.

-- Subtitles tend to improve learning from instructional television, particularly when the original program is not well organized.

-- Inserting questions in a television program does not seem to improve learning, but giving the students a rest pause does.

-- Whether a television program is used to begin or to end a daily lesson by the classroom teacher makes no difference in learning.

-- Repeated showings of a television program will result in more learning, up to a point. But teacher-directed follow-up, where available, is more effective than a second showing of the same program.

-- If saving time is important, a television program can probably be shortened and still achieve the minimum requirement of teaching.

-- There is no clear evidence to suggest whether eye-contact in television instruction will affect the amount of learning.

-- Problem-solving instruction on television is more effective than lecturing where the materials taught involve solving of a problem.

-- The students are likely to acquire the same amount of learning from instructional television whether the materials are presented as a lecture, or in an interview, or in a panel discussion.

-- Where accurate perception of images is an important part of learning, wide viewing angles and long distance will interfere with learning from instructional television.

-- Adequate attention provided by the classroom teacher will, in most cases at least, remedy the adverse effect due to a wide viewing angle.

-- Noise will reduce the effectiveness of learning from film and television so far as part of the learning comes from the auditory medium.

-- Instructional television appears to be equally effective with small and large viewing groups.

-- Instructional television may or may not be more effective with homogeneously grouped students, depending on other factors in the learning situation.

-- Whether instructional television can teach students who view at home as effectively as students in the classroom seems to depend on other conditions.

These are less than half of the conclusions presented by the authors, but the list seems adequate to show the level of research in ITV.

There is still some doubt as to whether ITV is an academic and professional "specialty." To some, an instructional television producer must possess certain basic television skills, but he must, more importantly, have "educational" qualifications. Thus, the ideal ITV executive is an ex-teacher, a person with educational credentials and someone who understands the establishment. To others, the ITV producer is the best that television can offer: a person with the skills of articulate communication, and superlative experience in television.

Regardless of whether an ITV professional is more I than he is TV, there remains virtually no specific training ground for these professionals. Colleges and universities continue to offer traditional education courses, and many of them have turned to "communication arts" as important, but the idea of instructional television as a field in itself is not prevalent among universities. Therefore, people continue to move into instructional television via back alleys and windows. Instructional television, if it is indeed a field of its own at all, attracts

commercial broadcasters, classroom teachers, school administrators and advertising managers. There is no universal front door. The title given to such people is usually "TV Utilization Specialist," or something related. Their duties vary from selling television services to writing teachers' guides.

A much more critical vacuum exists, however, if television is to have an impact on education. The colleges and universities dedicated in one way or another to the training of teachers tend to use the same curricula that seemed appropriate decades ago. The young, fresh graduate of a teacher-training institution is usually painfully ignorant about educational technology in general, and instructional television specifically. As thousands of new teachers move into classrooms, their attitudes are no different from those of their older and more experienced colleagues. There is no widespread attempt to train classroom teachers in the use of television, and this means that we have, at any given point, just about one hundred percent of the classroom teachers to train. This item alone contributes heavily to a rather disappointing state of the art.

CONCLUSION

Instructional television has made little impact on American Education. Commitment to the use of television is generally lacking on the part of administrators and teachers. While individual systems can claim some success, the simple imposition of television on traditional administrative and educational structures is usually disappointing. The medium itself cannot be blamed, however; the major reforms necessary are much more basic than any single medium. Our educational structure resembles the structures of our most decrepit urban sections, and massive renewal projects are necessary.

PROMINENT SOURCES OF PRE-RECORDED VIDEOTAPE MATERIALS*

Advanced Management Research, Inc. 1604 Walnut Street Philadelphia, Pennsylvania 19103	Courses for executives in business and industry.
Manager Ampex Tape Exchange 2201 Lunt Avenue Elk Grove Village, Illinois 60007	An exchange and distribution service for instructional and training courses and modules.
Director California Medical Television Network Continuing Education in Medicine University of California Extension 10962 Le Conte Los Angeles, California 90024	Postgraduate level modules covering many medical topics available to recognized medical agencies.
Center for Instructional Television Eastern Education Network 575 Technology Square Cambridge, Massachusetts 02139	Instructional courses available to schools and educational television stations within the Eastern Network area.
Programming Counselor Great Plains National Instructional Television Library University of Nebraska Lincoln, Nebraska 68508	Instructional courses and supplementary materials available to recognized educational institutions. Cover pre-school through college level.
Director of Broadcast Services Midwest Program on Airborne Television Instruction, Inc. Memorial Center, Purdue University Lafayette, Indiana 47902	Instructional courses and supplementary materials available to recognized educational institutions. Cover pre-school through college level.
Modern Talking Picture Service 1212 Avenue of the Americas New York, New York 10036	Portions of existing library of free-loan 16 mm titles now available on videotape.

Director of Field Services National Center for School and College Television Box A Bloomington, Indiana 47401	Instructional courses and supplementary materials available to recognized educational institutions. Cover pre-school through college level.
Director of Network Affairs Network for Continuing Medical Education 342 Madison Avenue New York, New York 10017	Postgraduate level modules covering many medical topics available to recognized medical agencies.
Director of Instructional Television Western Video Industries 1541 North Vine Street Los Angeles, California 90028	Instructional courses and supplementary materials available to recognized educational institutions. Cover pre-school through college level.

Also contact: Educational Television Stations and Regional Instructional Television Authorities and major Colleges and Universities.

* - As reported by Ken Winslow in Educational/Instructional Broadcasting, Volume 1, Number 4, September-October, 1968.

III. POLITICAL

The word political often connotes some kind of evil, but it is used here simply to describe relationships among people. The state of the art in education -- and therefore in instructional television -- is basically a function of the arrangements that exist among institutions, agencies and ultimately individuals.

The National Instructional Television Center has estimated that at least $12,000,000 a year are spent on school television. This money is used to operate machinery representing capital investments of approximately $250,000,000. These figures are impressive, but not in comparison with statistics describing the entire education enterprise in the country.

The size of the educational establishment, according to latest available estimates from the U.S. Office of Education and the National Educational Association, is staggering. There are more than 122,000 institutions of education, including elementary and secondary schools, junior colleges, colleges and universities. There are almost 22,000 separate school districts in the nation. There are more than 2½ million teachers at all levels, supervised by more than 210,000 administrators. The total number of students enrolled in the country is close to 58,000,000, and the total educational cost in the country is estimated at slightly more than $58,000,000,000 per year. These figures exclude military training, and other municipal or private instructional projects, so even these remarkable totals are probably something less than the truth.

The world of ITV is only a tiny part of the educational galaxy, which in itself is a comment on the state of the art.

As mentioned briefly in the preceding section, the "ITV specialist" often has the problem of being neither fish nor fowl. His training is usually his experience, and his formal study has usually been in education or in broadcasting. Those in commercial or noncommercial broadcasting tend to regard him as a representative of the educational establishment, and those in administrative or teaching positions look upon the same man as a weird sort of broadcaster. Glamour goes to the broadcaster, and the educator claims dignity. ITV personnel sometimes feel that this situation leaves them very little, and "second-class citizenship" is often the cry. In some cases it is deserved.

The problem seems to be that the medium itself doesn't fit within present administrative and organizational structures, and so the people representing the medium feel the rejection on professional and even personal grounds.

The usual public school system, for instance, has at its highest level an elected body. These members of the Board of Education are justifiably interested in the best possible education for their youngsters at the least possible cost. They listen and decide in much the same fashion that our legislators do, relying on their own common sense and their knowledge of

the wishes of their constituents. The superintendent, whom the Board hires, is the chief executive officer of the school system, and he is charged with providing the type of educational system that the Board desires. The superintendent is, in every possible way, under the control of the Board of Education, and if he pleases nobody else, he does what his collective boss requires.

The superintendent, in turn, hires an array of associate and assistant superintendents. One works in curriculum; another, in administration; a third in instructional services. Sometimes the list grows to well over half a dozen. Each of these public officials has his own staff; overlapping responsibilities and petty jealousies are as common as in any other enterprise.

Usually, an "audiovisual supervisor" is a member of one of the staffs. His placement on the tragic pyramid is not very high, but he takes his responsibilities very seriously, as he attempts first to keep his inventory of equipment up-to-date, and then to convince teachers that some tools are quite effective in learning.

As instructional television appears, it is usually the audiovisual supervisor who receives the "coordinating" assignment. If he does not receive it, and "AV" becomes separate from "TV," then he feels slighted, perhaps justifiably. In any case, the responsibility for television has often gone to school officials too far down in the administrative structure for any kind of massive action, and where it has not gone to an existing audiovisual service, the result has been internal political strife.

The concept of a "learning resources center" is growing more popular among the larger and more sophisticated school systems. Here, the audio-visual supervisor has become an "educational technologist," and his bailiwick includes promoting the use of computer assisted instruction, dial-access and other modern ideas. A school system with such a center usually places its director higher on the administrative ladder than the "audiovisual" predecessor, and instructional television -- and sometimes even libraries -- become part of this centralized effort. Even if the center is placed at the associate superintendent level, however, there are still internal pressures brought by other assistant or associate superintendents to keep the learning resources center a small, non-threatening empire.

It seems that most school systems simply cannot house divisions of television, or centers for technology, or learning resources branches. The reason is that the approach is through media, at the convenience of current administrative patterns.

If an approach were made through learning, then choices of techniques and media would become common decisions for all administrators, teachers and organizational divisions.

The same problem seems to occur at the state level. State Departments of Education are simply not organized to handle state-wide television systems. As a new "Division of Instructional Television" is created, and placed beneath

an associate superintendent for instructional services, the illusion is created that all technology -- and television in particular -- should be regarded as another organizational branch or division. (On American Samoa, as a contrary example, the decision was made that the entire educational system would take advantage of the distribution ability of television. The result is that administrators, division chiefs, associate superintendents and teachers accept the medium as basic to the system.)

Disappointments in instructional television occur most frequently as the new technical system is imposed upon older administrative patterns. It is likely that widespread and effective ITV will be known only as boards and administrators are willing to make necessary adjustments in staff, budgeting, curriculum development and overall commitment.

The placement of instructional television in existing organizational patterns can also result in hostility between traditional academic disciplines and the television experts. A well known new university in the South was founded only a few years ago with heavy publicity announcing that the school would be "media oriented," and that television would play a major part in academic life. Unfortunately, it seems that little attempt was made to convince the faculty that the new electronic techniques were worthwhile, and it was only a few years before major administrative shifts were made and the "media center" became something less than pivotal in the academic program. The error seems to be

in placing the technologist in the role of "witch doctor," and in establishing his activities as another department or division. The polarization that ultimately results has at one end the radical who claims that a medium is all that is necessary to right the many wrongs in instruction and at the other end, the traditionalist who claims that the idea of using television in any instruction at all is poppycock.

The various disagreements that become so fiery in local situations are less discernible through national organizations, since the jealousies become institutional rather than personal. Still, as a variety of educational and professional organizations progress, their efforts in television seem to remain somewhat separate and distinct. This could well be a sign of health, since we usually give homage to the concept of "pluralism," but it also provides for duplication and wasted effort in an area already marked by piecemeal and sporadic successes.

CONCLUSION

We have tended to approach ITV as a medium, as "another tool," and we have generally tried to impose it on existing organizational and administrative structures. This has led, time and again, to disappointment. Where television has proven most successful in instructional settings, it has been because there was a definite need to use the medium, and because administrators, teachers and students have been arranged accordingly.

NOTE

The installations and services described in Part IV were chosen by the National Association of Educational Broadcasters as examples of instructional uses of radio and television.

Though they have been edited, they were originally written by the agencies concerned, so they do not necessarily stress difficulties or disappointments.

I. NEW HANOVER COUNTY, NORTH CAROLINA

TV Kindergarten

The public schools of New Hanover County, North Carolina, are now using a commercially-owned CATV system to make possible the regular operation of a large-scale kindergarten program for pre-school youngsters living in the county's high population Wilmington area. The children are brought together each day in one of a dozen "community centers" scattered about this metropolitan area. The centers are conveniently-sized, multi-purpose activity rooms located in churches, recreation halls and the like -- spaces "loaned" the schools by various private and public agencies. Each such center is managed by a part-time, para-professional kindergarten leader, usually a mother from the immediate neighborhood who is paid a "tiny annual fee" to oversee the morning-long sessions being conducted for twenty-or-so-youngsters.

The centers are equipped with television receivers, wired into the local CATV network, and a few basic activity "toys" which are useful in creative play. There is no elaborate learning apparatus of any sort.

Each day's session begins with a special forty-five minute television lesson designed by a professional kindergarten specialist hired by the school system. Following the televised segment, the para-professional carries forward some carefully structured reinforcement activities built on the specific content of the electronic lesson element. Coordination for these related activities is made possible by a detailed printed guide distributed to local leaders and by regular meetings conducted for the leaders by the studio teacher herself.

In the opinion of the New Hanover school officials, the program is successful in meeting its "school readiness" objectives.

II. DES MOINES, IOWA PUBLIC SCHOOLS

Correlating Instructional Materials by Radio-Television-Film

In Des Moines, Iowa, KDPS-TV currently presents thirty-seven different courses, most of which are designed as complementary teaching resources for the elementary and secondary programs of instruction throughout Des Moines, the county schools, and neighboring counties.

Basically, the major part of the instruction provided through KDPS-TV is required for use by all teachers at the grade level of the lessons, unless there is some special reason for an exemption. Such a requirement has been successful in establishing more uniform levels of instruction and has resulted in more regular responses from teachers concerning the effectiveness and suitability of the lessons. Lessons are not necessarily scheduled daily. They may appear once a month, or three times a week, depending on their purpose.

In conjunction with the companion FM station, it has been possible to provide supplementary, reinforcing instruction that is directly related to the television and classroom lessons. (For example, conversational Spanish on the radio employs the same vocabulary as the television lessons, but with new sentences and a different format.)

Beyond this, KDPS-TV has inaugurated a daily afternoon series for children featuring films from major educational film suppliers that are curriculum-coordinated with the week's work in all basic subjects. This provides home viewing assignments and through a teacher-host who moderates the 90-minute afternoon program, suggestions are made for additional activities.

III. WASHINGTON COUNTY PUBLIC SCHOOLS
HAGERSTOWN, MARYLAND

An Early Effort to Utilize Television as the Core of Instruction

For the last twelve years, the Washington County School Board has been able to provide students improved instruction through the use of a six-channel, closed-circuit, County-wide television system. It is used not as a secondary source of information, but as the core for most of the instruction within the school system. The success of the Hagerstown Project can be measured by test results and in the attitudes of administrators, teachers, and students.

In 1956, the district needed many more teachers with more specialized training, as well as new facilities throughout the 465 square mile district to meet the anticipated enrollment increase of 10,000 students in a two-year period. The school board elected to make the maximum use of television in meeting their problems, and a proposal was presented to the Ford Foundation's Fund for the Advancement of Education for support.

Faced with the expiration of initial project funds in 1961, the school district had to decide whether to continue the use of television. Seventy two percent of the teachers then agreed that television was an important part of the system and should be retained. Students felt they had learned more by television than by conventional means, and the school board found that television utilization provided a good education for less than the average per student cost elsewhere in the State.

Today, Washington County children cannot imagine school without television, and teachers feel that the schools would be severely handicapped without television providing a core of the instruction.

IV. THE EDUCATIONAL TELEVISION ASSOCIATION OF METROPOLITAN CLEVELAND

An Educational Community's Cooperative Use of Facilities and Personnel

The Educational Television Association of Metropolitan Cleveland operates an educational TV station (WVIZ) on Channel 25, and has also accepted a leadership role in more effective allocation of Instructional Television Fixed Service channels. It recognized that the inadequate number of channels for the potential number of users throughout Cleveland, the inadequate number of professional personnel available, and high costs would all be inhibiting factors in developing useful ITFS programs. The Association is now attempting to serve as a coordinating administrative unit and as a cooperating production center for all educational interests in Cleveland.

It is premature to report on the outcome of this effort, since it is only now being developed. However, this action by the licensee of an educational television station represents a new approach to the integration of often competing hardware transmission systems. As currently developed, each party to the agreement is guaranteed 40 hours per week on a channel that its schools can receive; but the channel is not licensed to such user. Rather, it is rented on a guaranteed basis, and those users requiring more time can apply for it.

Materials can be produced locally through the production facilities of the Association, or rented from libraries or other learning groups; only technical standards must be met, and the user can determine whatever material he wishes to use. It is anticipated that common needs will lead to the shared production and use of lessons designed and televised under these arrangements.

V. THE DIOCESE OF BROOKLYN, NEW YORK

Improved Instruction Through ITFS

The Diocese of Brooklyn is developing a system-wide television facility to improve instruction in grades 1 - 12. Four Instructional Television Fixed Service channels are used to reach 212 school locations.

The Brooklyn system will soon be capable of interconnection with a new Instructional Television Communications Center in the Bronx, thereby affording an opportunity to develop instructional material cooperatively and to share the costs as well as the educational benefits. The present Brooklyn facility is used not only for schools, but also for adult education programs.

Currently, between 30 and 35 different series of lessons are distributed weekly; approximately 50% are obtained from instructional television libraries or exchange arrangements with other schools. Eight to ten new series are produced locally each year. The lessons are designed for in-service teacher education programs, as well as for student use.

The Brooklyn program has not begun on a massive scale, although its current operation allows for improved instruction in a variety of different teaching areas, most of which are identified by the teachers themselves.

VI. KBPS, PORTLAND, OREGON

In-School Use of Educational AM to Reach the Disadvantaged

KBPS, the only educational AM radio station in the United States, has been broadcasting to the Public Schools of Portland, Oregon for 45 years. Begun as a challenge for the engineering department of a technical high school, KBPS has developed over 100 series of programs for in-school use.

In 1967, with the help of a federal grant, the station created several series for disadvantaged children. One of these series, called "Teen Time," was broadcast in the poorer areas of the school district. Students in these schools telephoned in questions to a rotating panel of other teenagers. While low-key, this format gave these children a chance to participate in public events. Adults were not involved.

Another series was put together using books about individuals who had been challenged in life with different handicaps and who overcame them. The stories were adapted for radio by leading writers and dramatized for juveniles.

Following this series, the station allowed the disadvantaged children to broadcast their own creative writing.

The station is working on a weekly newscast directed at primary school children. This series will cover mainly community events, although national and international news will be mentioned. All programs are primarily prepared by teachers.

VII. SOUTH CAROLINA EDUCATIONAL TELEVISION CENTER COLUMBIA, SOUTH CAROLINA

Multi-Channel Accessibility to Televised Resources

South Carolina operates a closed-circuit television system capable of accommodating six channels simultaneously, and three broadcast television stations. Together, this gives the Center a capability of reaching 95% of the student population.

The Center has been operating for eight years. Respecting concerns about local control, teacher responsibility, and jurisdictional prerogatives of the State Education Department, the Center and its system is increasingly seen as the means by which curriculum reform can be effected on a regular basis. It is gradually becoming more than an adjunct to the schools, and it has assumed the major instructional content responsibility for arithmetic and mathematics from grades 4 - 12, and physical sciences in the high school program. Each year the role of the Center in providing this central instructional responsibility is applied to new areas of the curriculum.

Beyond its regular instructional programs in the schools, the educational television system in South Carolina has been used for direct professional instruction and training for doctors, state employees, law enforcement officers, food handlers, and industrial supervisors. A special corporation, the Educational Resources Foundation, has been established to design instructional training materials which are implemented statewide through the South Carolina Educational Television Center.

The annual operating budget of the Center is $3 million.

VIII. AMERICAN SAMOA

Cooperative Instruction by Television: A Model for Developing Areas

The education system of American Samoa has undergone a comprehensive change in instructional design, instructional effectiveness, and economic efficiency as a result of the deliberate application of advanced television technology.

By using six broadcast channels it is possible to reach all the schools in Samoa, even though several are 60-70 miles across the ocean. The six channels provide for a flexible schedule for the classrooms. In an average week, 170 lessons are produced by the Department of Education, representing nearly 60 hours of air time and almost 200 hours of studio time. Additional use of the facilities for evening broadcasts to adults means nearly 100 hours of programing are transmitted each week.

The television system in Samoa has given the education program the capability for being immediately responsive to changing needs in the classroom. New content, new teaching strategies, or remedial lessons can be diffused throughout the system immediately, without having to wait for the training of a new generation of teachers, or the retraining of the present ones.

The Samoan system spends under $500 per child per year for operation. Within this budget all curriculum materials are planned, developed, written, and printed; the television system is supported; transportation, teaching personnel, school lunch programs, and support services are provided. As student enrollment increases, the system will be able to reduce unit cost of instruction.

IX. CHICAGO TELEVISION COLLEGE

Credit Courses for Off-Campus Students

Since 1956 the more popular courses available at the fifty year old Chicago Junior College have been offered by television. To date over 1500 television students have completed degrees, and over 120,000 TV students have registered for courses. Originally begun with the help of the Ford Foundation, Television College has been able to keep investment costs down by leasing offices, studios, and broadcast time from Chicago's ETV station, WTTW. Since the winter of 1960 the cost of television instruction has fallen below the cost of conventional instruction on campus. Today the cost of a credit hour on TV is $23.43 as compared to $37.21 on campus.

The students who attend are for the most part physically handicapped, mothers with children at home, men who must work all day, and other groups normally isolated from conventional education. (Last year twenty-nine convicts in state prisons earned the Associate in Arts degree.) Through the use of telephone conferences held twice a week, counseling services, optional meetings on campus, and the availability of audio tapes of previous lectures, the system has proven flexible enough to serve these divergent groups.

Over the last ten years the television courses have included: Art, Biology, Business, Data Processing, Education, English, Humanities, Mathematics, Modern Language, Music, Physical Sciences, Social Sciences, and Speech.

X. THE PENNSYLVANIA STATE UNIVERSITY

Professors Reach Branch-Campuses by Television

The Pennsylvania State University has a full range of television production facilities, including six studios on the main campus. Of the 19 branch-campuses of the University, 14 are served by mailing videotaped materials, 1 by one-way microwave system, and another by a two-way microwave system. Twenty-eight courses are available to these campuses, some such as meteorology and art history taught by University Park specialists who could not be available on local campuses to teach in conventional classes.

Televised instructional materials are produced by the Division of Instructional Services, responsible for all resident instruction activity. The Division's television production facilities are closely aligned with other academic services that report directly to the Vice President for Resident Instruction. The University broadcast facility (WPSX-TV) is concerned academically only with continuing educational programs, and while the two television production units cooperate when appropriate on project design and materials, they are not otherwise related administratively.

Comparable systems for using TV to assist higher education are developing at Michigan State University, the University of Delaware, Florida Atlantic University and elsewhere.

XI. ALBANY MEDICAL COLLEGE

Continued Education by FM and Short-Wave Radio

The Albany Medical College, through its educational FM station, WAMU-FM, has developed a unique scheme for effective and economical post-graduate medical education and training.

The Division of Continuing Education uses the educational FM station 7 hours per week, to present lectures or discussions on new developments in medicine; physicians can participate directly in the discussions if they are at listening/viewing centers in hospitals which are connected by short-wave radio or direct telephone circuits to the medical college's station in Albany. Viewing is arranged by advance prepartation and distribution of slides to the hospital centers; they are displayed on cue from the radio lectures. Physicians not able to be at the Center can share in the total program by listening to WAMC-FM on radios in their homes, offices, or automobiles. The technical systems used by the Albany Medical College are flexible enough to allow for multiple origination points selected for professional priorities; faculty from more than 26 medical colleges contribute to the lectures and presentations.

WAMC-FM is used by the Albany Medical College for general educational and cultural broadcasts over 60 hours per week, beyond the time used for the professional medical broadcasts.

XII. GENESYS, UNIVERSITY OF FLORIDA
ENGINEERING COLLEGE
GAINESVILLE, FLORIDA

Graduate Courses Available to Working Engineers

GENESYS (Graduate Engineering Education System) joins aerospace installations with the University of Florida Engineering College, Gainesville. The system allows on-the-job scientists and engineers, who cannot meet in campus classes, to continue advanced degree work by participation on a two-way basis -- that is, video and audio feed-out with audio feed-back.

University staff professors teach approximately 50 courses in Industrial, Electrical and Aerospace Engineering from small television studios in Gainesville, Daytona, Port Canaveral, and Orlando. Each of the four major TV locations can broadcast to the others; library and study facilities are available at all seven receiving locations; professors try to visit students several times during the course.

Students (as few as two, or as many as fifteen) view the lectures with an opportunity to interrupt the lesson for clarification or to ask questions following. The audio feed-back system allows everyone to hear discussion on the lecture and on homework. All telecasts are live.

In addition to the regular course offerings, short, non-credit courses are given on Saturday mornings when the system is free. During the normal school period, facilities are used approximately 45 hours a week.

XIII. CENTER FOR MASS COMMUNICATION RESEARCH UNIVERSITY OF DENVER, COLORADO

Television Utilized for "Socialization" of Minority Groups

The Center for Mass Communication Research, University of Denver, has prepared a series of special television programs for minority groups through the facilities of the local educational station, KRMA-TV. The eight half-hour informational programs presented in the popular "soap-opera" format are intended to aid Negroes and Spanish-surnames. "Our Kind of World" was presented through the lives of two families living next to each other, one Negro and the other of Spanish-surname.

A sample of approximately 600 people was selected from a public housing project to research the needs and to test techniques. Topics chosen include: family health, buying and preparation of nutritional foods, family finances, job-seeking, social responsibilities in the community, and consumer behavior. A follow-up testing showed that the informational level of those watching was raised in all subjects but family financing.

The series was found to be realistic, believable, and informative. Professional and semi-professional actors from the two minority groups were employed. The Denver University Center for Mass Communications is currently researching a program of wider scope for the Los Angeles educational television station (KCET). This program series plans 14 weeks of day-time serials aimed at the Mexican-American population.

XIV. FORT MONMOUTH, NEW JERSEY

CCTV Provides Uniform, Technical Training on a Mass Scale for U.S. Army

The U.S. Signal Corps Schools at Fort Monmouth, New Jersey, makes heavy use of closed-circuit television to facilitate the training of several thousand men annually in basic technical courses in the electronics and communications area. The facilities, scattered throughout the military post, are equipped with an elaborate network of audio-video channels. Instructional and informational programming originates in a well-equipped studio complex located in the headquarters section.

Without use of regular television presentation, the mass-scale of course operations would be practically impossible to realize with the kind of responsive control and efficient coordination needed. In the opinion of school administrators, civilian and military, television is helping to make possible uniform, articulated courses-of-study which can be modified and improved school-wide on a truly comprehensive basis.

XV. NORTH AMERICAN AVIATION, CALIFORNIA

CCTV Provides Efficient Training and Operational Communications for Industry

When North American Aviation was awarded two large Apollo Spacecraft contracts in 1961, closed-circuit television was introduced to carry the major burden of training. An average day at the Downy, California plant might now start at 8:45 a.m. with a 23-minute training program entitled "Apollo Sequential Systems," transmitted to 25 of the 500 in-plant viewing locations. Next, perhaps "Accounting for Labor Costs," "Aircraft Wire Harness Fires," or "Configuration Management" would be selectively shown at appropriate on-the-job viewing locations. Today the 11,000 sq. ft. facility remains busy most of the time producing programs shown around the clock.

Management communication is also facilitated by television when everyday at 4 p.m. a news report is transmitted to top management about the day-to-day operation. Topics include important developments, major problems, proposals, new contracts -- all supported by charts, film clips, and video tape inserts displayed in combination with a two-way audio system that allows a briefing to become a conference.

North American does not have a full cost break down on the closed-circuit television facility, as it is considered a vital part of the company rather than an adjunct. It is known that under the Apollo contract the cost for training 1,000 workers in a specific subject was $0.55 per worker by CCTV as compared to $2.25 per person by regular methods.